

TRANSMISSION OF THE PATHOGEN *RENIBACTERIUM SALMONINARUM* UNDER DIFFERENT LABORATORY-CONTROLLED BARGING CONDITIONS

Joseph P. Dietrich
NOAA Fisheries
Northwest Fisheries Science Center/Newport Research Station
2032 SE OSU Drive, Newport, OR 97365
joseph.dietrich@noaa.gov

Frank J. Loge
University of California, Davis
Department of Civil and Environmental Engineering

Tracy K. Collier
NOAA Fisheries
Northwest Fisheries Science Center

Mary R. Arkoosh
NOAA Fisheries
Northwest Fisheries Science Center/Newport Research Station

ABSTRACT

In this AFEP-funded study, we investigate the likelihood of transmission of infectious disease in the outmigrant juvenile population of yearling Snake River Chinook salmon under controlled laboratory conditions intended to mimic variables that would occur during transportation. In previous AFEP studies, we detected salmonid pathogens by polymerase chain reaction (PCR) in barge hold water at Lower Granite Dam immediately after loading, as well as upon completion of the barge trip at Bonneville Dam. Similarly, we found an increase in the number of fish containing these pathogens after the barge trips relative to fish sampled prior to barging, suggesting pathogen transmission can occur during transport operations. To identify transport conditions that could minimize disease transmission, we evaluated the transmission of *Renibacterium salmoninarum*, the causative agent of Bacterial Kidney Disease (BKD), from infected 'donor' juvenile salmon to 'susceptible' juvenile salmon under three different holding densities (0.05, 0.18, and 0.50 lb/gal) that represented a range of conditions found during the FCRPS transportation season, as well as two different tank exchange rates (2.0 and 5.7 exchanges/hour). The susceptible fish were exposed to the donor fish and the simulated transport conditions for 60 hours in order to mimic the period of raceway collection and holding (24 hours), as well as downriver transport by barge (36 hours). After the 60-hour exposure, the susceptible fish were removed from the donor fish and monitored for 75 days, at which point their kidneys were collected and analyzed by conventional and quantitative PCR for the presence of *R. salmoninarum*. Although the analysis of our final experiment described above is still in progress, our preliminary experiments have demonstrated that one fish infected with *R. salmoninarum* can shed 615 million cells/liter into the surrounding water and pathogens from the infected donors were transmitted to the gills of susceptible fish (>90% detection) following a 60-hour exposure period at an average density of 0.31 lb/gal. The anticipated results of this work will provide USACE and stakeholders with information regarding the influence of basic transport variables on disease transmission and the operating conditions that may reduce the transmission of pathogens.